

Twins

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Incidence

- Incidence of spontaneous dizygotic twins:
Highest spontaneous incidence in Blacks and East Indians.
 - 1/56 in Belgium,
 - 1/70 in American Blacks
 - 1/300 in China.
- Incidence of monozygotic twins is unaffected by race (3-5/1000)
- Twins represent ~2.5% of births but 20% of VLBW infants

Types of Twins

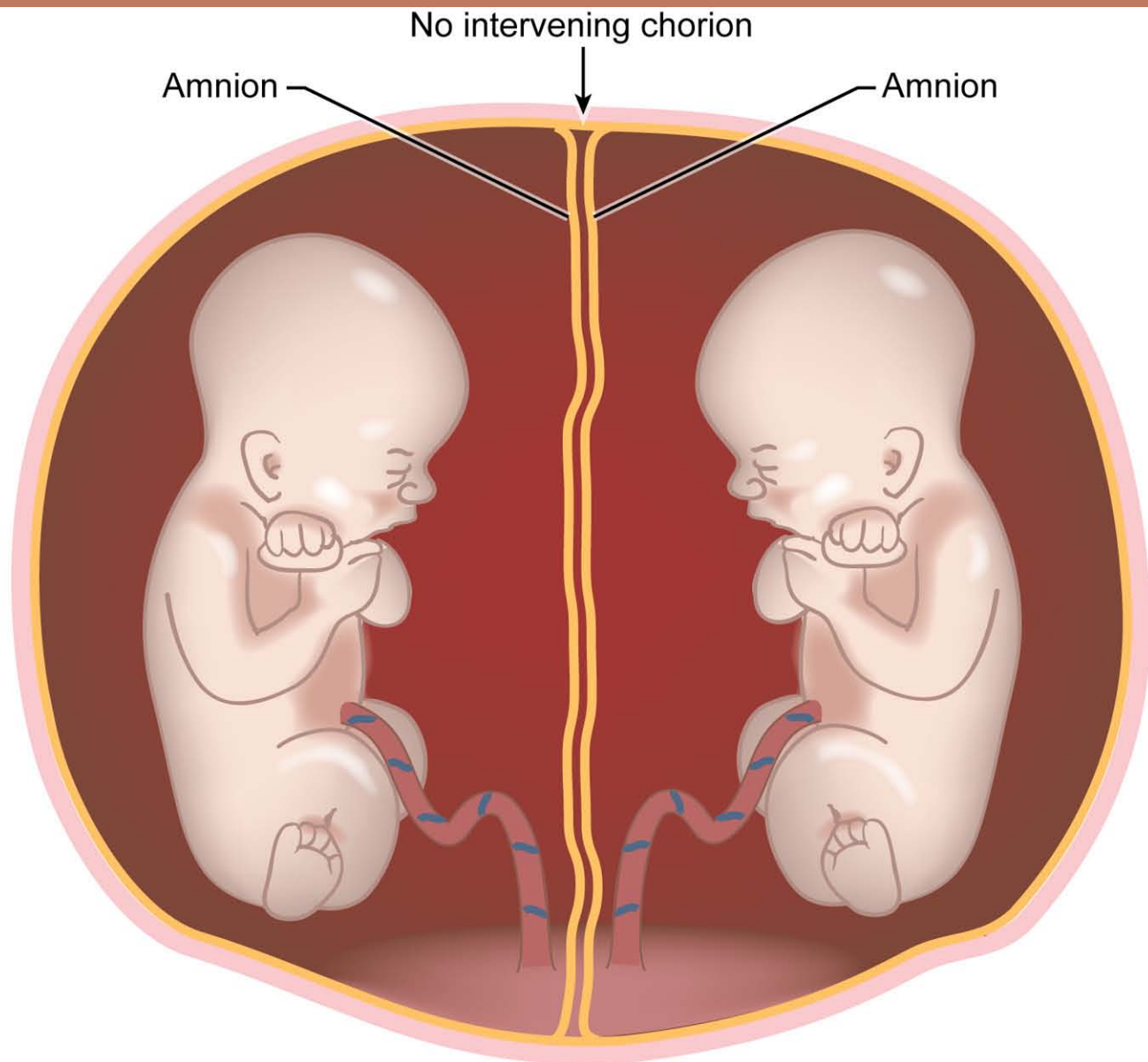
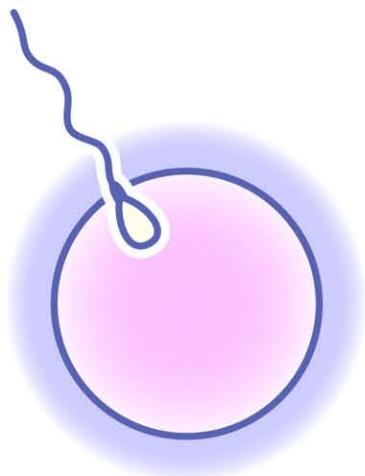
- Monozygotic (identical twin) From the same ovum
- Dizygotic: Not from the same ovum
- Conjoined: Monozygotic twins with probable late separation.
- Superfecundation: Fertilization of an ovum after one ovum has already been fertilized.

Conjoined Twins

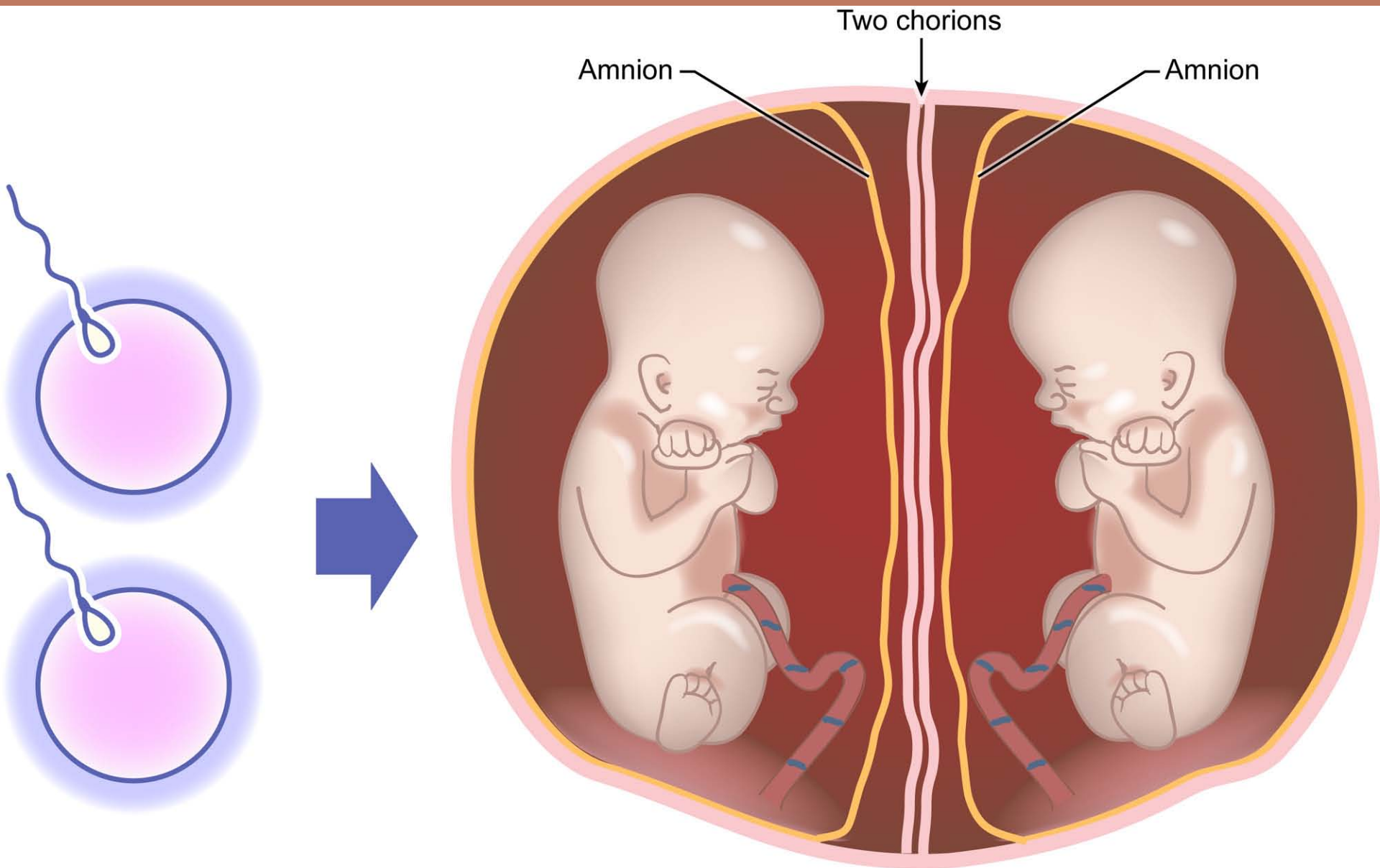


Placenta

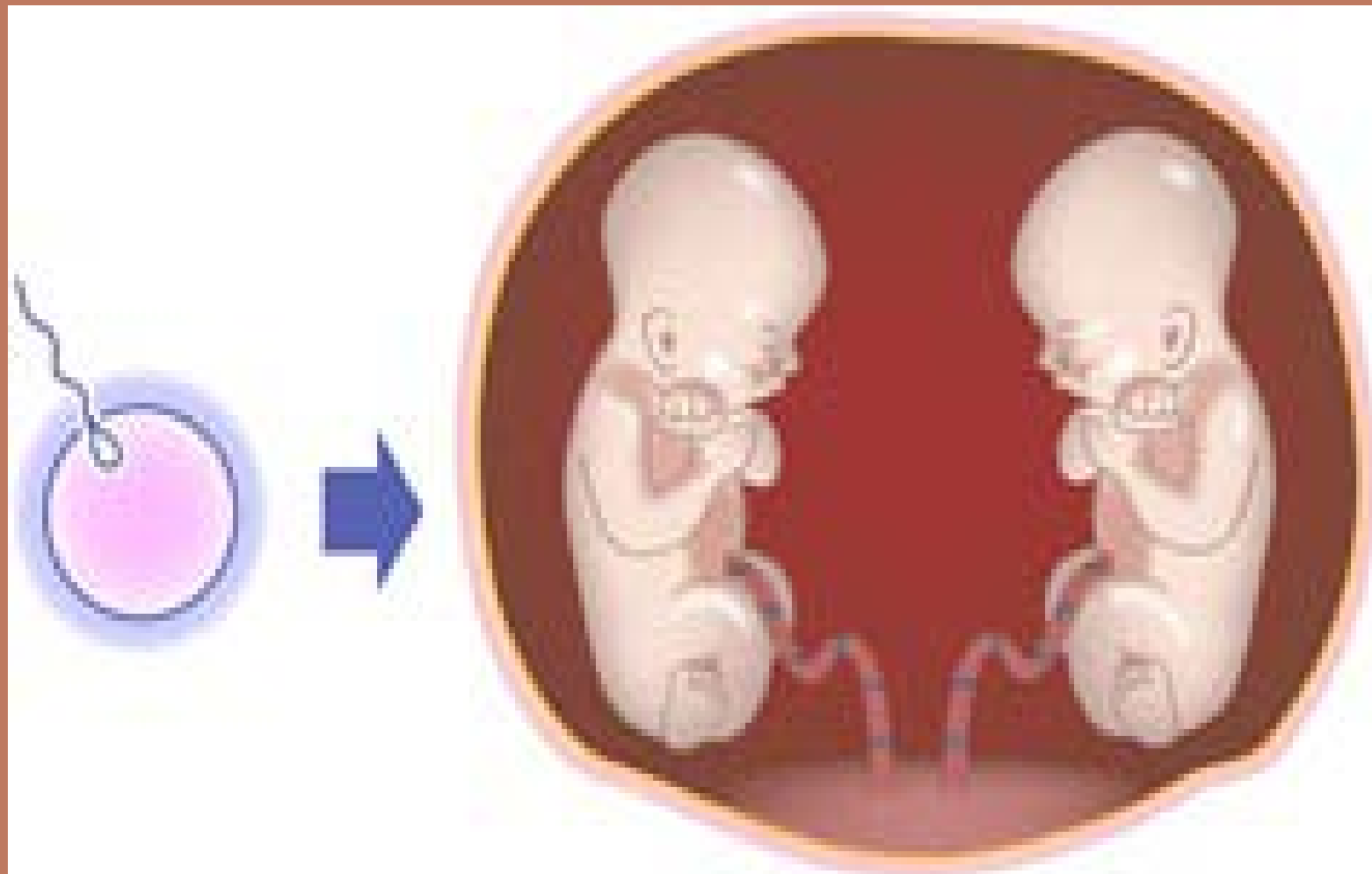
- Dichorionic: separate placentas. Can be dizygotic or monozygotic (twinning at 1st cell division or the morula stage can result in two amnions, two chorions and possibly two placentas.)
- 1/3 of monozygotic twins are dichorionic and diamnionic
- Monochorionic placenta: Those are presumed monovular though there have been cases with IVF of monochorionic placenta's with different sexes and they have been chimeric.



Monozygotic
(Monochorionic, Diamniotic)



Dizygotic
(Dichorionic, Diamniotic)



Monozygotic
(Monochorionic, Monoamniotic)



Placenta

- Vascular anastomoses: Occur in monochorionic twins. (A-A, V-V, A-V) (Occur in almost all placentas)
- A combination of A-A and V-V anastomoses is associated with a lethal fetus (acardiac fetus)
- Due to reversed arterial perfusion.
- Due to strain of work on “normal twin” there is a 50% mortality in that twin. (cardiac failure & hydrops)

Acardiac Twin



Fig. 7. Open selective delivery of acardiac twin. (Courtesy of M. Harrison, MD, San Francisco, CA.)

TTTS

- Artery from 1 twin drains to Vein of the other.
- Occurs primarily with monochorionic placentas typically diamniotic/monochorionic (DiMo)
- Can be acute or chronic

Acute TTTS

- Rare.
- Typically occurs at delivery.
 - Sudden hemodynamic incident: vascular rupture with a vasa previa, cord compression.
- Typically due to V-V anastomoses
- Twins similar weight
- May have similar Hct at birth that will change as fluids shifts over the first few hours of life.
- Can also occur if one twin dies, leads to other's death or probable cerebral injury.

Chronic TTTS

- Complicates ~10-20% of monochorionic pregnancies
- Donor twin is anemic, small, has oligohydramnios (from decreased renal perfusion), and abnormal doppler flow in umbilical artery.
- Recipient is plethoric, large, has cardiomegaly and polyhydramnios.
- Associated with a 5g/dl Hgb and 20% body weight difference.
- Hydrops may occur in either twin, but CHF seen most in recipient
- If detected <20weeks 80-100% mortality if untreated.

Chronic TTTS

Neonatal complications:

- Primarily due to CV compromise or vascular disruption.
- ~50% have cardiac dysfunction at birth
- ~5-10% will have sustained long term cardiac dysfunction.

Neonatal complications of TTTS

- Ischemic brain injury (d/t cardiac dysfunction and hemodynamic instability)- can occur in ~5-8% based on MRI
- If one twin dies the incidence can be 5-50% for neurologic injury if the 2nd twin survives due to alterations in cerebral blood flow.
- Multiorgan dysfunction- renal failure, intestinal atresias, aplasia cutis.
- Hyperviscosity in recipient – hemolytic jaundice, other ischemic lesions.

Neonatal complications of TTTS

- Increased rate of Cardiac malformations in all DiMo twins and even greater if complicated by TTTS (? Due to fluids shifts)
- VSD, PS, ASD most common.

TTTS Treatment

- Amnioreduction
- Microseptostomy
- Fetoscopic Laser Photocoagulation
- Fetoscopic cord coagulation
- Sequential treatment.

TTTS



TTTS

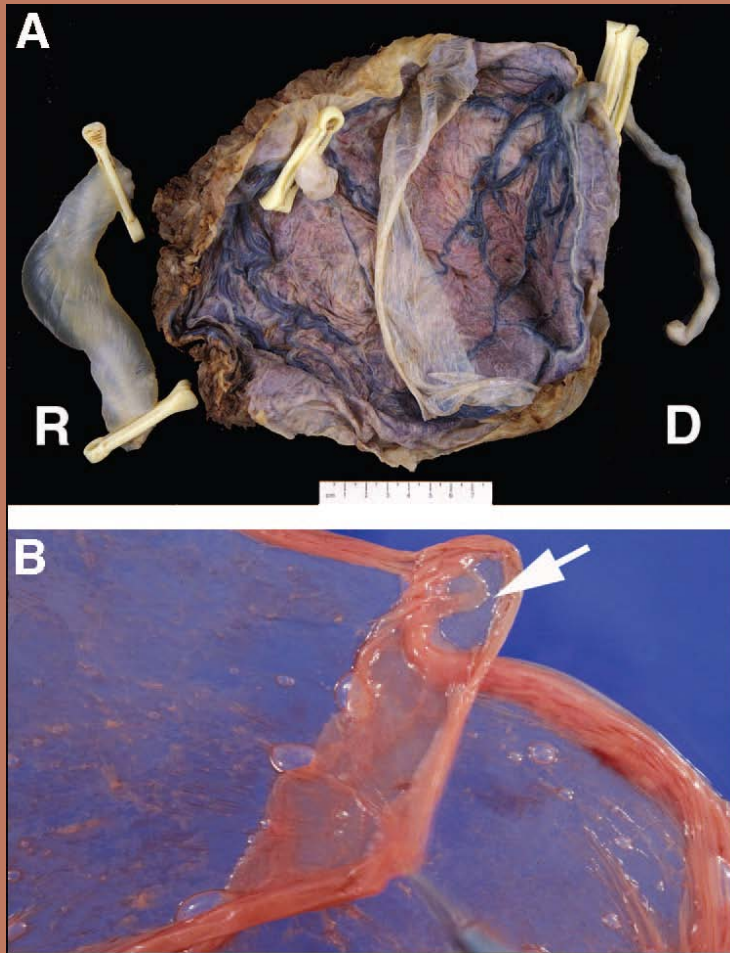


Figure 3. A. Diamniotic monochorionic placenta from a case of “stuck twin syndrome” demonstrating thin cord of donor (D; single cord clamp) on right and edematous, thick cord of recipient (R; double cord clamps) on left. B. Due to the absence of interposed chorionic tissues, the apposed amnions of the diamniotic monochorionic placental dividing membrane are transparent (arrow) and can be pulled apart with ease. Figures modified from Faye-Petersen, et al (53) and used with permission.

SGA

- Hypothermia, hypoglycemia
- Asphyxia from chronic hypoxia in utero.
- Polycythemia/hyperviscosity
- Higher mortality: 5-20 times and AGA infant of the same gestational age.
- Higher rate of long term neurodevelopmental outcome.

Risk's with twins

- Pregnancy: Polyhydramnios, hyperemesis, preeclampsia
- Placenta: vasa previa, velamentous insertion of the cord
- Presentation: Breech
- Labor: Preterm labor

Problem's with Twins Con't

- Babies:
 - 2nd twin increased risk of RDS and asphyxia (placenta may separate after the 1st twin is born).
 - IUGR, TTTS,
 - congenital anomalies (hip dysplasia (from crowding), vascular communication with embolization (ileal atresia, porencephaly, cutis aplasia)

Outcomes

- Higher perinatal mortality
- Higher preterm rate but compared to singles of same gestation and size no sig difference in neurodevelopmental outcome
- Higher rate of asphyxia in 2nd twin
- If one twin dies in utero the surviving twin is at greater risk for CP and poorer ND outcome.

Assisted Reproductive Technology (ART)

- Higher rate of multiples with ART
- Can be hormone-assisted ovulation, egg donation, sperm donation or selection, IVF, ICSI, intracervical or intrauterine insemination, gamete intrafallopian transfer, zygote intrafallopian transfer
- Increasing frequency: 1% of preg in US in 2003 and 5% in Denmark.
- Benefits: Assist couples who can't get pregnant, early diagnosis of genetic diseases, assist couples with illnesses (HIV)

ART-Risks

- Fetal: higher mortality at all stages of dev
- Increased rate of multiples (25-41% of ART pregnancies)
- With multiples increased rate of prematurity, SGA, slower postnatal growth (especially with ICSI)
- Twins more likely to be dizygotic
- Some studies found a higher rate of IVH (15.4% vs 3.9% for natural twins) unclear etiology
- Maternal risks: if donor oocyte higher rate of pregnancy induced hypertension and GDM

ICSI

- Used when few sperm are available, select single sperm (no “natural selection” also have mechanical perforation of the oocyte)
- Associated with increased rate of sex chromosome abnormalities and translocations (1.4% vs 0.3% in natural conceived pregnancies). May be due to underlying male infertility then procedure itself.
- No evidence that standard IVF increases chromosome anomalies.

ART (especially ICSI)

- Increased rate of imprinting disorders (Beckwith-Wiedemann and Angelman syndrome)
- These can be seen after methylation problems which may be from in vitro culture conditions (pH and serum Concentrations)
- See LBW which may be from deregulation of imprinting pathways for fetal and placental growth
- These LBW infants may be at risk later in life for IDDM as in utero the body learns to thrive on limited resources then there is an abundance later in life putting them at risk.

Summary

- Neonatal effects of Twins:
 - Higher risk for preterm delivery and its complications
 - SGA
 - Asphyxia
 - Brain injury
 - TTTS-hydrops/CHF/anemia

References

- Kliegman: Nelson Textbook of Pediatrics 18th ed
- Cowan JM. Assisted Reproductive Technology and Preimplantation Genetic Diagnosis Impact on the Fetus and Newborn. Neoreviews 2007;8 e 127-132
- Johnson et al. Developmental and genetic outcomes in children conceived through assisted reproductive Technologies. NeoReviews 2006; 7; e615-626
- Thureen et al. The Small-For-Gestational Age Infant: NeoReviews 2001. Vol2 N6 E139.
- Faye-Petersen. Twin-to-Twin Transfusion Syndrome: Part 1. Types and Pathogenesis. NeoReviews 2008; 9;e370-379
- Faye-Petersen. Twin-to-Twin Transfusion Syndrome: Part 2. Infant Anomalies, Clinical Intervention and Placental Examination. NeoReviews 2008; 9;e380-392
- Faye-Petersen. Twin-to-Twin Transfusion Syndrome: Part 3. Mortality and Neurodevelopmental Outcomes Following Intervention. NeoReviews 2008;9;e393-398
- Rand et al. Complicated Monochorionic Twin Pregnancies: Updates in Fetal Diagnosis and Treatment. Clinics in Perinatology 36 (2009) 417-430
- Habi et al. Twin-to-Twin Transfusion Syndrome: A comprehensive Update. Clinics in Perinatology 36 (2009) 391-416.